

Notice of Allowability

Application No.

10/633,700

Examiner

Victor J. Taylor

Applicant(s)

CHOI ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 14 March 2005.
2. ☒ The allowed claim(s) is/are 1-19.
3. ☒ The drawings filed on 05 August 2003 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

Drawings

1. The drawings were received on August 05, 2003. These drawings are approved.

Response to Arguments

2. Applicant's arguments with the amendment to the claims filed on March 14, 2005 with respect to the amendment and the argument concerning the two axis earth magnetic sensor and the inclinometer for the amended claim limitation of "the microprocessor including a virtual Z-axis earth magnetic data generator part for generating the virtual Z-axis earth magnetic data based on the outputs of the two-axis magnetic sensor and the inclinometer" have been fully considered and are persuasive. The 102 (e) rejection of December 14 2004 is moot and has been withdrawn.
3. Applicant's arguments on page 10 of 16 in the remarks and filed on March 14, 2005 with respect to the typographical error in paragraph 4 of the last office action concerning the rejected claims 1-6, and objected too claims 7-9 have been fully considered and are persuasive. The typographical error in paragraph 4 of the office action on December 14 2004 has been corrected. For the official record claims 1-6 were rejected and claims 7-9 were objected to based on the rejected base claim 6.

Allowable Subject Matter

4. Claims 1-19 are allowed.
5. The following is an examiner's statement of reasons for allowance:

The amendments of record concerning the independent limitations for “the microprocessor including a virtual Z-axis earth magnetic data generator part for generating the virtual Z-axis earth magnetic data based on the outputs of the two-axis magnetic sensor and the inclinometer” and “generating a virtual Z-axis earth magnetic data using a two axis earth sensor” and the argument of record convince the examiner that the instant application is allowable over the cited art of record.

The apparatus for calculating an azimuth angle in amended claim 1 comprising “a two-axis earth magnetic sensor mounted on a device that requires azimuth information for measuring a strength of an earth magnetic field according to the azimuth information if the device moves ”...[and] with “an inclinometer for calculating an attitude such as a roll angle and a pitch angle” ...[and] with “a signal conditioning unit including an analog to digital converter for converting the sensor data into a digital value”...and/or in combination with the steps wherein “the microprocessor for calculating the azimuth information by compensating for an error using outputs of the two axis earth magnetic sensor and the inclinometer, the microprocessor including a virtual Z axis earth magnetic data generation part for generating virtual Z axis earth magnetic data based on the outputs of the two axis magnetic sensor and the inclinometer” for calculating the azimuth angle is not found in the cited art of record.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 2-5, and 12-14 are dependent on the allowed independent claim 1 and are allowed at least for the reasons cited above.

The method for calculating an azimuth angle in amended claim 6 with steps for “converting an analog value sensed by a sensor into a digital value using an analog to digital converter”...[and] with steps “for storing the converted sensor data in an internal register of the microprocessor”...[and] with steps for “calculating the attitude and obtaining a coordinate conversion matrix using the data obtained from an inclinometer”...and/or in combination with the steps wherein “calculating earth magnetic data on a horizontal coordinate system using the three axis earth magnetic data wherein the three axis earth magnetic data includes a combination of the two axis earth magnetic sensor data and the one axis sensor data and a coordinate conversion” ...[and with]...”steps for calculating the azimuth angle using the calculated earth magnetic data” for calculating the azimuth angle is not found in the cited art of record.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 7-11 are dependent on the allowed independent claim 6 and are allowed at least for the reasons cited above.

The method for calculating an azimuth angle in claim 15 using method steps for “measuring a strength of an earth magnetic field according to the azimuth information using a two-axis earth magnetic sensor mounted on a device that requires azimuth information”...[and] under the condition “if the device moves”...[and] with steps for “calculating an attitude using an inclinometer”...[and] with steps for “converting the sensor data into a digital value”...[and/or] in combination with the steps for “calculating the azimuth information by compensating for an attitude error using outputs of the two

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axis earth magnetic sensor and the inclinometer with the calculating including generating a virtual Z axis earth magnetic data based on the outputs of the two axis magnetic sensor and the inclinometer" for calculating the azimuth angle is not found in the cited art of record.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 16-19 are dependent on the allowed independent claim 15 and are allowed at least for the reasons cited above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor J. Taylor whose telephone number is 517-272-2281. The examiner can normally be reached on 8:00 to 5:30 PM.

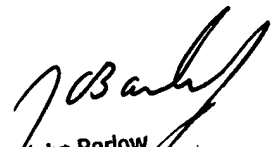
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VJT

March 18, 2005


John Barlow
Supervisory Patent Examiner
Technology Center 2800